

# Comments from the audience

A: Research Needs

B: Research Agenda

C: Opportunities

# Comments from the audience

*(Sonny Xue - Siemens)*

Converters can provide integrated protection functions to eliminate the need for dedicated circuit breaker.

Sub-synchronous resonance damping.

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*(Mike Nowak - NETL)*

A:

Improved frequency matching of DG (i.e. PV) with distribution system. One utility considers PV “dirty” power because of the large number of PV installations on its distribution network.

B:

Need for simulation and modeling aimed at transitioning from existing to future paradigm, e.g. “How will we phase in new technology?”

C:

Advocate for more collaboration between DOE EERE/OE and collaboration between power electronics community and building technologies community. Opportunities for demonstration partners include Navy Yard and Oregon BEST.

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# Comments from the audience

*(George Walker – N/A)*

A:

Where in a hierarchical grid, should regulation occur (and how fast)? Research should explore the tradeoffs/interplay between local (fast, sans context) and global (slow w/ context) control strategies. Local regulation should slow down simplify system dynamics to the extent possible to improve the strategic decision making capabilities at higher layers of abstraction. Maybe this is already being done, for ex. Varentech.

C:

Partnership opportunities – Rural electric cooperatives many of which have different loads at the end of long unbalanced feeders.

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# Comments from the audience

*(Terry Ericson - Ericson Innovations LLC - (Former ONR))*

Power converter enabled:

- Complexity to non complexity

- The system to work like the model

- Does not need to be coupled or decoupled. Could both or either depending on the real time need.

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*(Donald Shields - University of Pittsburgh)*

A:

What are human health safety implication of products or technologies developed by this research?

B:

What roles exist for social science input into understanding barriers to wide spread use of power electronics in grid (understanding use of customer use/dynamics).

C:

Should we conduct a survey of NETLRUA schools, industry partners facilities that are capable of testing or demonstration or validation? Will there be gaps that can be identified or addressed to avoid duplication?

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# Comments from the audience

*(Mike Soboroff – Rock Creek Strategies)*

A:

Current Research: Considerable work going on with various wide band gap devices – materials systems in the near term are Si or ???

B:

Need to enable manufacturing base of materials suppliers and device manufacturers.

C:

The NNMI and the current DOE FOA on WBG semiconductors evince manufacturers.

ARPA-E anticipated FOA for more advanced WBG systems (also ADEPT, GENI)

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*(Sharon Beerman-Curtin - ONR)*

Semiconductors, high temp packaging, high speed with low interconnects, high voltage, integration with the system

Address connections issue from convert to grid.

Validation/Testing – coordinate GTC with Electric Shop R&D Consortium (ESRDC) effort.

Might be good synergy, possibility modeling

Power converters as circuit breakers. Both communities are interested in HVDC. Circuit breakers and the system affects optimization.

Anant Argawal – new DOE mfg program, BAA on the street now.

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June 10, 2013

# Comments from the audience

*(Paul Ohodnicki - NETL)*

A:

Underpinning technology required to enable the next generation of converters required for flow control (material, packaging, etc.).

Converter development that leverages component and devices for next generation performance.

Integration of advanced existing converters.

B:

Basic tech development in parallel nearer term device development and demonstration.

Outcomes should be successful technology benchmark progression in near term and commercially adopted technology in longer term.

C:

Should align most cases with DOE program offices and leverage with DoD and other program offices as appropriate.

Emerging opportunities to test the collaboration with DoE labs (NREL, LBNL, ANL, etc..)

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# Comments from the audience

*(Vincent Degeorge - CMU)*

A:

Operation at higher frequencies? Size reduction?  
Critical material

B:

1. Yes,
2. Collecting information surveys of commercial installers how is the size, efficiency cost valued
3. Practically how to decrease converter cost: cooling components, overall size, material and circuit cost

C:

Universities – material development; Industry – Production-level scale up  
National labs are often isolated high-power density electricity needs  
Make more information available from one project to the other.

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# Comments from the audience

*(Phil Bolin – Mitsubishi Electric Power Products)*

What would bulk electricity supply look like if very inexpensive converter had existed from the very beginning (100 years ago)?

Is HVDC easier to be accepted by public?

Study prospect for underground high capacity long distance DC transmission

DC generators? At high voltage?

Superconducting

Cold cathode vacuum tube technique (advanced fusion systems)

Fresh look by Universities at ordinary components such as capacitors, reactors, transformers, etc... as needed for converters and FACTS systems

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# Comments from the audience

*(Al Hefner – NIST)*

A:

Technology and approaches for grid-interactive, multi-functional, operational PCS interfaces that capture several value strings. Value streams include DER, integration T&D functions, power-flow control, protection, and microgrid.

B:

Investigate how HV-HF switch mode power conversion provides size, weight, cost, functionality benefits.

Understanding integration and requirements for HV-HF grid applications:

- What are passive technologies

- What is the package

- EMC issues

C:

SGIP, DRGS, DEWG

HV-HF module models for Navy

DER test coordination group (NIST, Oakridge, NREL, Sandia)

# Conclusions after voting...

# A. Research Needs

1. Wide Band Gap (WBG) Devices, and HF converter development - Packaging, Passives and Materials
2. Multi-Functional, grid-interactive, PCS operational interfaces
  1. Capture multiple value streams
  2. Integrate devices (e.g. DER)
  3. T&D functions (power-flow control, protection)
  4. Islanding
3. Hierarchical Distributed Control, Architectures (e.g. DC), and System Stability

## B. Research Agenda

1. Modeling and Simulation
2. Manufacturing Base
3. Customer Understanding/Social Science

# C. Opportunities

1. Collaboration between Government, Industry and Academia
2. WBG NNMI, Future ARPA-e FOAs on WBG etc..?